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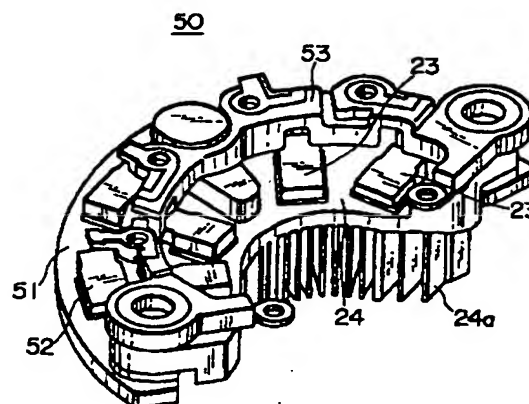
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(54) 【発明の名称】 車両用交流発電機

(57) 【要約】

【課題】 この発明は、整流器の径方向の寸法を小さくすることができるとともに、外径側のヒートシンクに固定されたダイオードの冷却効率が向上した車両用交流発電機を得る。

【解決手段】 この発明は、正極側ヒートシンク24及び負極側ヒートシンク51はシャフトに直交してそれぞれ略平面状に配置されており、かつ内径側の正極側ヒートシンク24に固定された正極側ダイオード23は長手方向が正極側ヒートシンク24の径方向に沿って配置されているとともに、外径側の負極側ヒートシンク51に固定された負極側ダイオード52は長手方向が負極側ヒートシンク51の周方向に沿って配置されている。



23 : 正極側ダイオード
 24 : 正極側ヒートシンク
 24a : フィン
 51 : 負極側ヒートシンク
 52 : 負極側ダイオード
 53 : サーキットボード

【特許請求の範囲】

【請求項1】 ケースと、このケース内に回転可能に設けられたシャフトと、このシャフトに固定された回転子と、前記ケースの内壁面に固定されステータコアに導線が巻回されたステータコイルが設けられたステータと、前記ケース内に設けられているとともに前記ステータコイルに電氣的に接続されステータコイルで生じた交流を直流に整流する整流器とを備え、

前記整流器は、円弧帯状の正極側ヒートシンクの表面に矩形状の正極側ダイオードが複数個固定されているとともに、円弧帯状の負極側ヒートシンクの表面に矩形状の負極側ダイオードが複数個固定されて構成された車両用交流発電機であって、

内径が異なる前記正極側ヒートシンク及び前記負極側ヒートシンクは前記シャフトに直交してそれぞれ略平面状に配置されており、かつ正極側または負極側ヒートシンクのうち内径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの径方向に沿って配置されているとともに、外径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの周方向に沿って配置され、回転子に取り付けられたファンの回転でケース内に導かれた外気により、外径側のヒートシンクに固定されたダイオード、内径側のヒートシンクに固定されたダイオードが冷却されるようになっている車両用交流発電機。

【請求項2】 内径側のヒートシンクの径方向の寸法は外径側のヒートシンクの径方向の寸法よりも大きい請求項1に記載の車両用交流発電機。

【請求項3】 内径側のヒートシンクの表面積は外径側のヒートシンクの表面積よりも大きい請求項2に記載の車両用交流発電機。

【請求項4】 正極側ダイオード間の空隙部及び負極側ダイオード間の空隙部が放射線上に位置するように、正極側ダイオード及び負極側ダイオードが配設されている請求項1ないし請求項3の何れかに記載の車両用交流発電機。

【請求項5】 内径側のヒートシンクの裏面には回転子の軸線方向に延びた複数のフィンが設けられている請求項1ないし請求項4の何れかに記載の車両用交流発電機。

【請求項6】 ヒートシンクはアルミニウムで構成された請求項1ないし請求項5の何れかに記載の車両用交流発電機。

【請求項7】 ステータコアには導線が3相Y結線されたステータコイルが設けられており、内径側のヒートシンク、外径側のヒートシンクにはそれぞれ4個のダイオードが固定されている請求項1ないし請求項6の何れかに記載の車両用交流発電機。

【請求項8】 ステータコアには導線が3相Y結線されたステータコイルが2組設けられており、内径側のヒ-

ートシンク、外径側のヒートシンクにはそれぞれ6個のダイオードが固定されている請求項1ないし請求項6の何れかに記載の車両用交流発電機。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、ステータコイルで生じた交流を直流に整流する整流器と備えた車両用交流発電機に関するものである。

【0002】

【従来の技術】図10は従来の車両用交流発電機の断面図であり、この発電機は、アルミニウム製のフロントブラケット1及びリヤブラケット2から構成されたケース3と、このケース3内に設けられ一端部にプーリ4が固定されたシャフト6と、このシャフト6に固定されたランドル型の回転子7と、ケース3内の内壁面に固定されたステータ8と、シャフト6の他端部に固定され回転子7に電流を供給するスリップリング9と、スリップリング9に摺動する一対のブラシ10と、このブラシ10を収納したブラシホルダ11と、ステータ8に電氣的に接続されステータ8で生じた交流を直流に整流する整流器12と、ブラシホルダ11に嵌着されたヒートシンク17と、このヒートシンク17に接着されステータ8で生じた交流電圧を調整するレギュレータ18とを備えている。

【0003】回転子7は、電流を流して磁束を発生する回転子コイル13と、回転子コイル13を覆って設けられその磁束によって磁極が形成されるポールコア14とを備えている。ポールコア14は一対の交互に噛み合った第1のポールコア体21及び第2のポールコア体22とから構成されている。第1のポールコア体21及び第2のポールコア体22の軸方向端面には、冷却用の遠心ファン5が溶接されている。ステータ8は、ステータコア15と、このステータコア15に導線が巻回され回転子7の回転に伴い、回転子コイル13からの磁束の変化で交流が生じるステータコイル16とを備えている。

【0004】整流器12は、円弧帯状で裏面に複数個のフィン24aがある正極側ヒートシンク24と、この正極側ヒートシンク24の表面に半田付けで固定された4個の正極側ダイオード23と、円弧帯状の負極側ヒートシンク26と、この負極側ヒートシンク26に半田付けで固定された4個の負極側ダイオード25と、各々のダイオード23、25とステータコイル16とを電氣的に接続するサーキットボード27とを備えており、ステータ8で生じた三相交流を直流に整流している。正極側ヒートシンク24と負極側ヒートシンク26とは、シャフト6に直交してほぼ平面状に配置され、ケース3内に収納されている。正極側ヒートシンク24及び負極側ヒートシンク26は熱伝導率の高いアルミニウムで構成されており、また外径側の負極側ヒートシンク26はケース3に直付けされてアースされている。正極側ダイオード

23及び負極側ダイオード25は、共にその基板が正方形で、その1辺より突出するリードターミナルの接続部を保護するため、全体外形が矩形状に樹脂モールド成形されている。

【0005】上記構成の車両用交流発電機では、バッテリー（図示せず）からブラシ10、スリップリング9を通じて回転子コイル13に電流が供給されて磁束が発生する一方、エンジンによってプーリ4は駆動され、シャフト6によって回転子7が回転するため、ステータコイル16には回転磁界が与えられ、ステータコイル16には起電力が生じる。この交流の起電力は、整流器12の正極側ダイオード23、負極側ダイオード25を通して直流に整流されるとともに、レギュレータ18によりその大きさが調整されて、バッテリーに充電される。

【0006】回転子コイル13、ステータコイル16、正極側ダイオード23、負極側ダイオード25、レギュレータ18は交流機発電中、常に発熱している。そして、例えば定格出力電流100Aクラスの交流発電機で温度的に高い回転数では、回転子コイル13では60W、ステータコイル16では500W、正極側ダイオード23及び負極側ダイオード25の合計では120W、レギュレータ18では6Wの発熱量がある。過度の発熱は、交流発電機の性能を悪化させ、また部品の寿命を低下させることになる。

【0007】そのため、回転子7の回転とともにファン5が回転し、この回転によりケース3の開口部Aからケース3内に外気が流入し、その外気は図10の矢印イで示すように流れ、負極側ヒートシンク26、負極側ダイオード25、正極側ヒートシンク24、正極側ダイオード23を冷却している。その外気は、その後ファン5により半径外側方向に流れ、リヤ側のステータコイル16のエンド部を冷却し、開口部Bから外気へ放出される。また、ファン5の回転により開口部Cからもケース3内に外気が流入し、その外気は図10の矢印ロで示すように流れ、レギュレータ18のパワートランジスタを冷却している。その外気は、その後ファン5により半径外側方向に流れ、リヤ側のステータコイル16のエンド部を冷却し、開口部Dから外部に放出される。同様に、フロントブラケット1の開口部Eから流入した外気は、ファン5により半径外側方向に流れ、フロント側のステータコイル16のエンド部を冷却している。その外気はその後、開口部Fからケース3の外部に放出される。

【0008】

【発明が解決しようとする課題】上記構成の車両用交流発電機では、正極側ダイオード23のリード線及び負極側ダイオード25のリード線がサーキットボード27と電氣的に接続し易くするため、正極側ダイオード23のリード線及び負極側ダイオード25のリード線がそれぞれ対向するように、つまり正極側ダイオード23及び負極側ダイオード25がそれぞれ放射線上に配置してい

た。この場合、サーキットボード27と各ダイオード23、25のリード線との接続についてはスペースをとらず、また容易に電氣的に接続できるものの、負極側ダイオード25の長手方向が径方向に沿って配列されているので、外径側の負極側ヒートシンク26の径方向の寸法は大きくなってしまい、ヒートシンク26の径方向の寸法（図12においてY）は、内径側の正極側ヒートシンク24の径方向の寸法（図12においてX）と比べて同等またはそれ以上（ $Y \geq X$ ）になってしまい、小型化できないという問題点があった。

【0009】また、外気は図12において矢印ハに示すように負極側ダイオード25間を空隙部を通過した後、正極側ダイオード23間の空隙部を通過するが、その通過量は正極側ダイオード23の空隙部の寸法で決定されるため、外径側の負極側ヒートシンク26には、外気通過量の増大に寄与しない、つまり負極側ダイオード25の冷却向上に寄与しない不要が空間が存在しているという問題点があった。

【0010】また、負極側ヒートシンク26上では、外周側が外気の流入側であり、外気の温度が低く、負極側ヒートシンク26は内周側に進むに従って高温であるが、負極側ダイオード25の長手方向が径方向に沿って配列されているので、外径側の負極側ヒートシンク26の径方向の寸法は大きくなってしまい、それだけ負極側ヒートシンク26において高温領域が多くを占めることになり、負極側ダイオード25の内周側の箇所でも局所的に高温になるという問題点があった。

【0011】この発明は、上記のような問題点を解決することを課題とするものであって、整流器の径方向の寸法を小さくすることができるとともに、外径側のヒートシンクに固定されたダイオードの冷却効率が向上した車両用交流発電機を得ることを目的とするものである。

【0012】

【課題を解決するための手段】この発明の請求項1に係る車両用交流発電機では、内径が異なる正極側ヒートシンク及び負極側ヒートシンクはシャフトに直交してそれぞれ略平面状に配置されており、かつ正極側または負極側ヒートシンクのうち内径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの径方向に沿って配置されているとともに、外径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの周方向に沿って配置され、回転子に取り付けられたファンの回転でケース内に導かれた外気により、外径側のヒートシンクに固定されたダイオード、内径側のヒートシンクに固定されたダイオードが冷却されるようになっている。

【0013】この発明の請求項2に係る車両用交流発電機では、内径側のヒートシンクの径方向の寸法は外径側のヒートシンクの径方向の寸法よりも大きい。

【0014】この発明の請求項3に係る車両用交流発電

機では、内径側のヒートシンクの表面積は外径側のヒートシンクの表面積よりも大きい。

【0015】この発明の請求項4に係る車両用交流発電機では、正極側ダイオード間の空隙部及び負極側ダイオード間の空隙部が放射線上に位置するように、正極側ダイオード及び負極側ダイオードが配設されている。

【0016】この発明の請求項5に係る車両用交流発電機では、内径側のヒートシンクの裏面には回転子の軸線方向に延びた複数のフィンが設けられている。

【0017】この発明の請求項6に係る車両用交流発電機では、ヒートシンクはアルミニウムで構成されている。

【0018】この発明の請求項7に係る車両用交流発電機では、ステータコアには導線が3相Y結線されたステータコイルが設けられており、内径側のヒートシンク、外径側のヒートシンクにはそれぞれ4個のダイオードが固定されている。

【0019】この発明の請求項8に係る車両用交流発電機では、ステータコアには導線が3相Y結線されたステータコイルが2組設けられており、内径側のヒートシンク、外径側のヒートシンクにはそれぞれ6個のダイオードが固定されている。

【0020】

【発明の実施の形態】実施の形態1. 図1はこの発明の実施の形態1の車両用交流発電機の断面図であり、この発電機は、アルミニウム製のフロントブラケット1及びリヤブラケット2から構成されたケース3と、このケース3内に設けられ一端部にブーリー4が固定されたシャフト6と、このシャフト6に固定されたランドル型の回転子7と、ケース3内の内壁面に固定されたステータ8と、シャフト6の他端部に固定され回転子7に電流を供給するスリップリング9と、スリップリング9に摺動する一対のブラシ10と、このブラシ10を収納したブラシホルダ11と、ステータ8に電気的に接続されステータ8で生じた交流を直流に整流する整流器50と、ブラシホルダ11に嵌着されたヒートシンク17と、このヒートシンク17に接着されステータ8で生じた交流電圧を調整するレギュレータ18とを備えている。

【0021】回転子7は、電流を流して磁束を発生する回転子コイル13と、回転子コイル13を覆って設けられその磁束によって磁極が形成されるポールコア14とを備えている。ポールコア14は一対の交互に噛み合った第1のポールコア体21及び第2のポールコア体22とから構成されている。第1のポールコア体21及び第2のポールコア体22の軸方向端面には、冷却用の遠心ファン5が溶接されている。ステータ8は、ステータコア15と、このステータコア15に導線が巻回され回転子7の回転に伴い、回転子コイル13からの磁束の変化で交流が生じるステータコイル16とを備えている。

【0022】整流器50は、円弧帯状で裏面に複数個の

フィン24aがある正極側ヒートシンク24と、この正極側ヒートシンク24の表面に溶接で固定された4個の正極側ダイオード23と、円弧帯状の負極側ヒートシンク51と、この負極側ヒートシンク51に溶接で固定された4個の負極側ダイオード52と、各々のダイオード23、52とステータコイル16とを電気的に接続するサーキットボード53とを備えており、ステータ8で生じた三相交流を直流に整流している。正極側ヒートシンク24と負極側ヒートシンク52とは、シャフト6に直交してほぼ平面状に配置され、ケース3内に収納されている。正極側ヒートシンク24及び負極側ヒートシンク52は熱伝導率の高いアルミニウムで構成されており、また外径側の負極側ヒートシンク51はケース3に直付けされてアースされている。正極側ダイオード23及び負極側ダイオード52は、共にその基板が正方形で、その1辺より突出するリードターミナルの接続部を保護するため、全体外形が矩形状に樹脂モールド成形されている。

【0023】図3は図2の整流器50の平面図、図4は図2の整流器50の正極側ヒートシンク24に固着された正極側ダイオード23の平面図、図5は図2の整流器50の負極側ヒートシンクに固着された負極側ダイオード52の平面図である。矩形状の正極側ダイオード23は従来例と同様に、その長手方向が正極側ヒートシンク24の径方向に沿って配設されている。一方、正極側ヒートシンク24の外径側に隣接して設けられた負極側ヒートシンク51には、4個の負極側ダイオード52がその長手方向がそれぞれ負極側ヒートシンク51の周方向に沿って配列されている。これにより、負極側ヒートシンク51の径方向寸法が従来の負極側ヒートシンク26と比較して小さくなる。逆に、負極側ヒートシンク51の周方向において負極側ダイオード52が占める割合が大きくなるも、元来外径側の負極側ヒートシンク26の周方向では負極側ダイオード25間に余裕空間があるので、負極側ヒートシンク51の周方向の寸法を変える必要がない。

【0024】上記構成の車両用交流発電機では、回転子7の回転とともにファン5が回転し、この回転によりケース3開口部Aからケース3内に外気が流入し、その外気は図1の矢印イで示すように流れ、負極側ヒートシンク51、負極側ダイオード52、正極側ヒートシンク24、正極側ダイオード23を冷却している。その外気は、その後ファン5により半径外側方向に流れ、リヤ側のステータコイル16のエンド部を冷却し、開口部Bから外気へ放出される。また、ファン5の回転により開口部Cからもケース3内に外気が流入し、その外気は図1の矢印ロで示すように流れ、レギュレータ18のパワートランジスタを冷却している。その外気は、その後ファン5により半径外側方向に流れ、リヤ側のステータコイル16のエンド部を冷却し、開口部Dから外部に放出さ

れる。同様に、フロントブラケット1の開口部Eから流入した外気は、ファン5により半径外側方向に流れ、フロント側のステータコイル16のエンド部を冷却している。その外気はその後、開口部Fからケース3の外部に放出される。

【0025】この実施の形態では、外径側の負極側ヒートシンク51上では、外周側が外気の流入側であり、外気の温度も低く、負極側ヒートシンク26は内周側に進むに従って高温であるが、負極側ダイオード52の長手方向が周方向に沿って配列されているので、負極側ヒートシンク51の径方向の寸法は小さくてすみ、それだけ負極側ヒートシンク51において高温領域が占める割合が小さくなり、負極側ダイオード52の冷却効率が向上する。なお、正極側ダイオード23間の空隙部と負極側ダイオード52間の空隙部とは放射線上にあり、遠心ファン5による外気流は、負極側ヒートシンク51及び正極側ヒートシンク24上では円滑に流れる。

【0026】この実施の形態の車両用交流発電機について、実際に実験したところ、外気温度20℃の場合、負極側ヒートシンク52は従来125℃であったのが、120℃に温度が下がった結果が得られた。

【0027】実施の形態2。図6はこの発明の実施の形態2による車両用交流発電機の整流器60の平面図、図7は図6の整流器60の正極側ヒートシンク61に固着された正極側ダイオード62の平面図、図8は図6の整流器60の負極側ヒートシンク63に固着された負極側ダイオード64の平面図である。実施の形態1では正極側ダイオード23及び負極側ダイオード52がそれぞれ4個ずつであったが、この実施の形態では、さらに正極側及び負極側ダイオード62、64を追加してそれぞれ6個配置したものである。この例は、ステータに三相Y結線したステータコイルが2つ設けられた車両用交流発電機の整流器60の場合であり、各々の三相交流を整流している。

【0028】従来のダイオード配置でダイオード個数を増やす場合、整流器サイズを大きくすることなく実現しようとする、特に内径側ヒートシンク上のダイオードが近接して冷却性が悪化しダイオードの温度がダイオード許容温度値をオーバーするため、冷却性を向上させる対策として内径側のヒートシンクの径方向の寸法を拡大せざるを得ず、整流器全体も径方向寸法も拡大せざるを得なかった。

【0029】これに対し、この実施の形態では、負極側ダイオード64の長手方向を負極側ヒートシンク63の周方向に沿って配設したことにより、外径側の負極側ヒートシンク63の径方向寸法を小さくでき、その結果、ダイオードの数を増やす前と同じ整流器サイズのまま、内径側の正極側ヒートシンク61の径方向の寸法を大きくすることができる、即ち正極側ヒートシンク61の冷却面積を拡大することができ、内径側の正極側ダイオ

ド62の冷却性が確保される(図9(A)及び図9(B)参照 $T1 > T3$ 、 $T4 > T2$ 、 $T5 = T6$)。また、このように整流器60内の設計自由度が増したので、整流器60内の外気流の圧力損失の低減にも自由度が増え、ファン5の吐き出し側外気で冷却されているステータコイル16の冷却性が向上する。なお、各上記実施の形態では、負極側ヒートシンクを外径側に配置し、正極側ヒートシンクを内径側に配置したが、負極側ヒートシンクを内径側に配置し、正極側ヒートシンクを外径側に配置した整流器にもこの発明が適用できるのは勿論である。また、各ヒートシンクにそれぞれ7個以上のダイオードを設けた場合でもこの発明は適用できるのは勿論である。

【0030】

【発明の効果】以上説明したように、この発明の請求項1に係る車両用交流発電機によれば、内径が異なる正極側ヒートシンク及び負極側ヒートシンクはシャフトに直交してそれぞれ略平面状に配置されており、かつ正極側または負極側ヒートシンクのうち内径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの径方向に沿って配置されているとともに、外径側のヒートシンクに固定された各ダイオードは長手方向がヒートシンクの周方向に沿って配置され、回転子に取り付けられたファンの回転でケース内に導かれた外気により、外径側のヒートシンクに固定されたダイオード、内径側のヒートシンクに固定されたダイオードが冷却されるようになっているので、整流器の径方向の寸法を小さくすることができ、小型化が可能であるとともに、外径側のヒートシンクに固定されたダイオードの冷却性が向上する。

【0031】また、この発明の請求項2に係る車両用交流発電機によれば、内径側のヒートシンクの径方向の寸法は外径側のヒートシンクの径方向の寸法よりも大きくすることができ、内径側のヒートシンクに固定されたダイオードの冷却性が向上し、またそのダイオードの配置自由度が増し、外気流の圧力損失を低減することができ、例えばそのダイオードの下流側のステータの冷却性が向上する。

【0032】また、この発明の請求項3に係る車両用交流発電機によれば、内径側のヒートシンクの表面積は外径側のヒートシンクの表面積よりも大きくすることができ、請求項2と同様な効果を得ることができる。

【0033】また、この発明の請求項4に係る車両用交流発電機によれば、正極側ダイオード間の空隙部及び負極側ダイオード間の空隙部が放射線上に位置するように、正極側ダイオード及び負極側ダイオードが配設されているので、整流器内では外気は円滑に流れ、正極側及び負極側のダイオードの冷却性が向上する。

【0034】また、この発明の請求項5に係る車両用交流発電機によれば、内径側のヒートシンクの裏面には回

転子の軸線方向に延びた複数のフィンが設けられているので、外気とヒートシンクとの接触面積が増大し、そのヒートシンクに固定されたダイオードの冷却性が向上する。

【0035】また、この発明の請求項6に係る車両用交流発電機によれば、ヒートシンクは熱伝導性の高いアルミニウムで構成されているので、安価でかつ効率よくダイオードは冷却される。

【0036】また、この発明の請求項7に係る車両用交流発電機によれば、ステータコアには導線が3相Y結線されたステータコイルが設けられており、内径側のヒートシンク、外径側のヒートシンクにはそれぞれ4個のダイオードが固定されているので、小型で冷却性が優れた3相Y結線の車両用交流発電機を簡単に得ることができる。

【0037】この発明の請求項8に係る車両用交流発電機によれば、ステータコアには導線が3相Y結線されたステータコイルが2組設けられており、内径側のヒートシンク、外径側のヒートシンクにはそれぞれ6個のダイオードが固定されているので、小型で冷却性が優れた3相Y結線2組の車両用交流発電機を簡単に得ることができる。

【図面の簡単な説明】

【図1】 この発明の実施の形態1による車両用交流発電機の正断面図である。

【図2】 図1の整流器の斜視図である。

【図3】 図2の整流器の平面図である。

【図4】 図2の整流器の正極側ヒートシンクに固着された正極側ダイオードの平面図である。

【図5】 図2の整流器の負極側ヒートシンクに固着された負極側ダイオードの平面図である。

【図6】 この発明の実施の形態2による車両用交流発電機の整流器の平面図である。

【図7】 図6の整流器の正極側ヒートシンクに固着された正極側ダイオードの平面図である。

【図8】 図6の整流器の負極側ヒートシンクに固着された負極側ダイオードの平面図である。

【図9】 (A)、(B)は正極側ヒートシンク及び負極側ヒートシンクの径方向寸法の取り合いの説明図である。

【図10】 従来の車両用交流発電機の正断面図である。

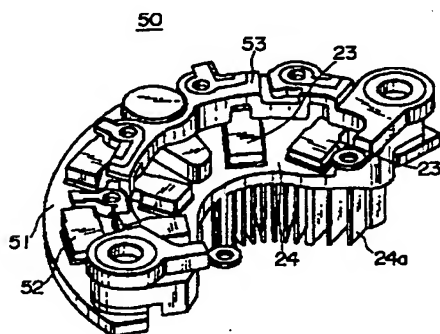
【図11】 図10の整流器の斜視図である。

【図12】 図10の整流器のサーキットボードを除いたときの平面図である。

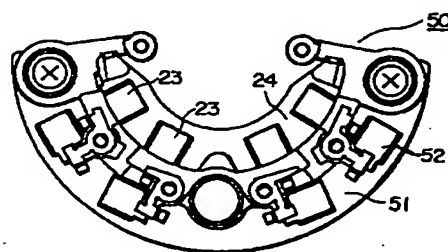
【符号の説明】

3 ケース、5 ファン、6 シャフト、7 回転子、8 ステータ、23、62 正極側ダイオード、24、61 正極側ヒートシンク、24a フィン、50、60 整流器、51、63 負極側ヒートシンク、52、64 負極側ダイオード。

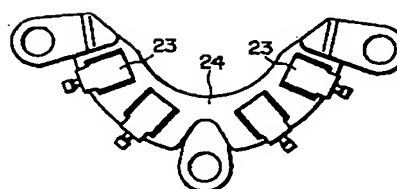
【図2】



【図3】

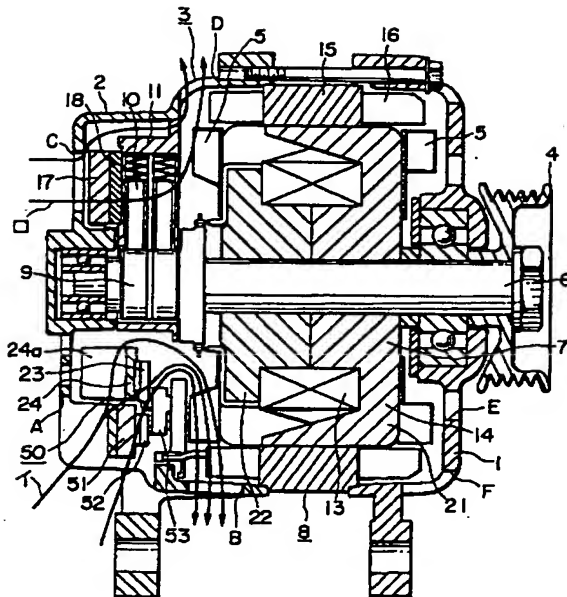


【図4】



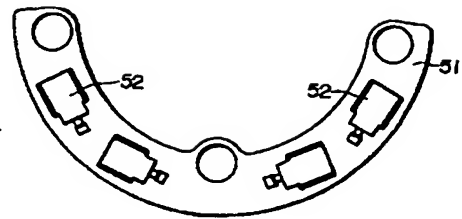
23：正極側ダイオード
24：正極側ヒートシンク
24a：フィン
51：負極側ヒートシンク
52：負極側ダイオード
53：サーキットボード

【図1】

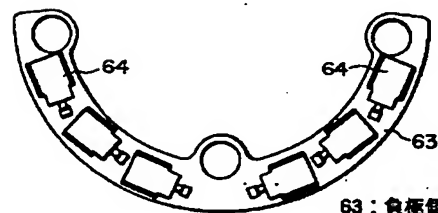


3: ケース
5: ファン
6: シャフト
7: 回転子
8: ステータ
50: 整流器

【図5】

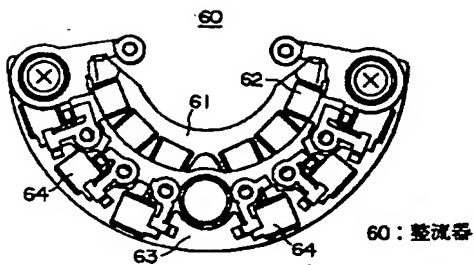


【図8】



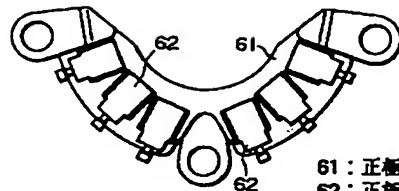
63: 負極側ヒートシンク
64: 負極側ダイオード

【図6】



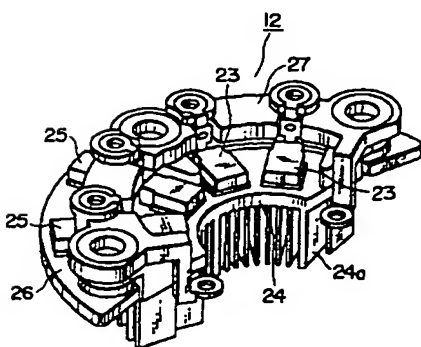
60: 整流器

【図7】

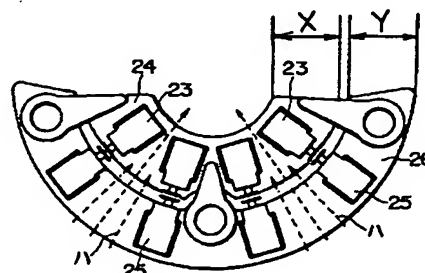


61: 正極側ヒートシンク
62: 正極側ダイオード

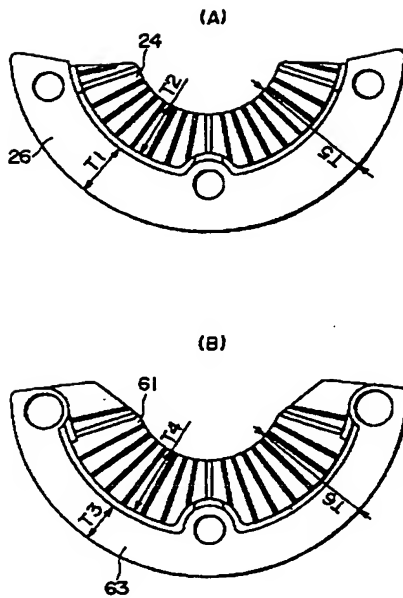
【図11】



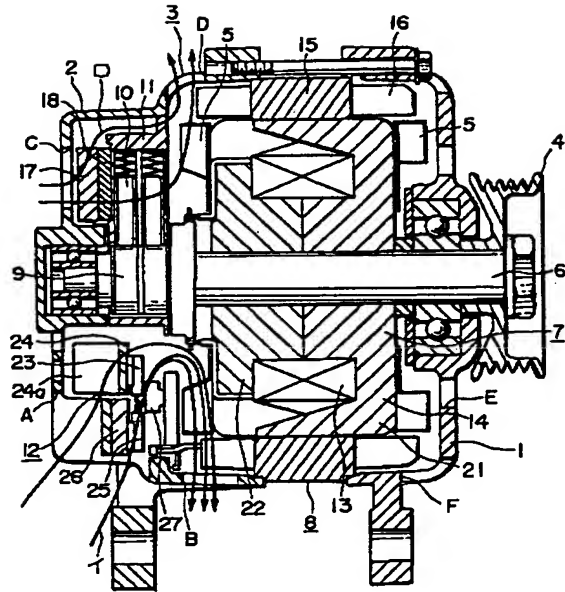
【図12】



【図9】



【図10】



フロントページの続き

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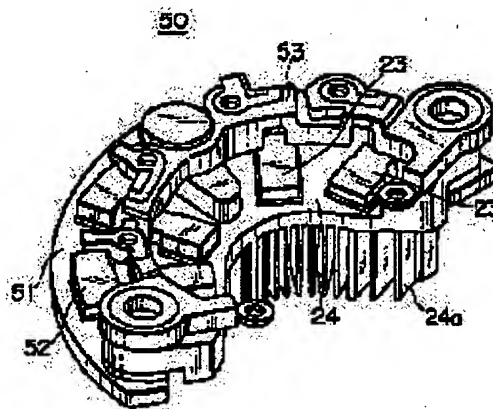
(72)Inventor : ASAO YOSHITO
KASHIWABARA TOSHIKI

(54) AC GENERATOR FOR VEHICLE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an AC generator, for which the radial size of a rectifier can be reduced and the cooling efficiency of diodes fixed to a outside diameter- side heat sink can be improved.

SOLUTION: A positive polarity-side heat sink 24 and a negative polarity-side heat sink 51 are arranged flat perpendicular with respect to a shaft, and positive polarity-side diodes 23 fixed to the inner heat sink 24 are arranged along the radial direction of the heat sink 24. In addition, negative polarity-side diodes 52 fixed to the outer heat sink 51 are arranged with their longitudinal directions in parallel with the peripheral direction of the heat sink 51.



LEGAL STATUS

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[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] It has the stator characterized by providing the following, and the rectifier which rectifies the alternating current which connected with the aforementioned stator coil electrically and was produced in the stator coil while being prepared in the aforementioned case to a direct current. While two or more rectangle-like positive-electrode side diodes are being fixed to the front face of a radii band-like positive-electrode side heat sink, the aforementioned rectifier It is the AC generator for vehicles with which two or more front faces of a radii band-like negative-electrode side heat sink were fixed, and rectangle-like negative-electrode side diode was constituted. The aforementioned positive-electrode side heat sink with which bores differ, and the aforementioned shaft and the aforementioned negative-electrode side heat sink cross at right angles, and are arranged at the abbreviation plane, respectively. And while the longitudinal direction is arranged along the direction of a path of a heat sink, each diode fixed to the heat sink by the side of a bore a positive-electrode side or among negative-electrode side heat sinks Each diode fixed to the heat sink by the side of an outer diameter by the open air drawn in the case by the rotation of a fan which the longitudinal direction has been arranged along with the hoop direction of a heat sink, and was attached in the rotator The AC generator for vehicles with which the diode fixed to the heat sink by the side of an outer diameter and the diode fixed to the heat sink by the side of a bore are cooled. Case. The shaft prepared possible [rotation] in this case. The rotator fixed to this shaft. The stator coil by which it was fixed to the internal surface of the aforementioned case, and lead wire was wound around the stator core.

[Claim 2] The size of the direction of a path of the heat sink by the side of a bore is a larger AC generator for vehicles according to claim 1 than the size of the direction of a path of the heat sink by the side of an outer diameter.

[Claim 3] The surface area of the heat sink by the side of a bore is a larger AC generator for vehicles according to claim 2 than the surface area of the heat sink by the side of an outer diameter.

[Claim 4] The AC generator for vehicles given in any of the claim 1 in which positive-electrode side diode and negative-electrode side diode are arranged, or a claim 3 they are so that the opening section between positive-electrode side diodes and the opening section between negative-electrode side diodes may be located on radiation.

[Claim 5] The AC generator for vehicles given in any of the claim 1 by which two or more fins prolonged in the direction of an axis of a rotator are prepared in the rear face of the heat sink by the side of a bore, or a claim 4 they are.

[Claim 6] A heat sink is an AC generator for vehicles given in any of the claim 1 which consisted of aluminum, or a claim 5 they are.

[Claim 7] The AC generator for vehicles given in any of the claim 1 by which the stator coil to which three-phase-circuit Y connection of the lead wire was carried out is prepared in the stator core, and four diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, or a claim 6 they are.

[Claim 8] The AC generator for vehicles given in any of the claim 1 by which 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core, and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, or a claim 6 they are.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the rectifier which rectifies the alternating current produced in the stator coil to a direct current, and the AC generator for vehicles which it had.

[0002]

[Description of the Prior Art] Drawing 10 is the cross section of the conventional AC generator for vehicles. this generator The case 3 which consisted of the drive side bearing brackets 1 and commutator side bearing brackets 2 made from aluminum, The shaft 6 by which it was prepared in this case 3 and the pulley 4 was fixed to the end section, The run dollar type rotator 7 fixed to this shaft 6, and the stator 8 fixed to the internal surface within a case 3, The slip ring 9 which is fixed to the other end of a shaft 6 and supplies current to a rotator 7, The brush 10 of the couple which slides on the slip ring 9, and the brush holder 11 which contained this brush 10, It has the rectifier 12 which rectifies the alternating current which connected with the stator 8 electrically and was produced in the stator 8 to a direct current, the heat sink 17 attached in the brush holder 11, and the regulator 18 which adjusts the alternating voltage which pasted up on this heat sink 17 and was produced in the stator 8.

[0003] The rotator 7 is equipped with the rotator coil 13 which passes current and generates magnetic flux, and the field core 14 in which the rotator coil 13 is covered, it is prepared, and a magnetic pole is formed of the magnetic flux. The field core 14 consists of the 1st field-core object 21 which geared by turns [of a couple], and the 2nd field-core object 22. The centrifugal fan 5 for cooling is welded to the shaft-orientations end face of the 1st field-core object 21 and the 2nd field-core object 22. The stator 8 is equipped with the stator core 15 and the stator coil 16 which lead wire is wound around this stator core 15, and an alternating current produces in change of the magnetic flux from the rotator coil 13 with rotation of a rotator 7.

[0004] The positive-electrode side heat sink 24 with which a rectifier 12 has two or more fin 24a in a rear face with radii band-like, The positive-electrode side [four pieces] diode 23 fixed to the front face of this positive-electrode side heat sink 24 with soldering, The radii band-like negative-electrode side heat sink 26 and the negative-electrode side [four pieces] diode 25 fixed to this negative-electrode side heat sink 26 with soldering, It has Sir KITTOBO-DO 27 which connects electrically each diodes 23 and 25 and stator coil 16, and the three-phase alternating current produced in the stator 8 is rectified to a direct current. The positive-electrode side heat sink 24 and a shaft 6 and the negative-electrode side heat sink 26 cross at right angles, are arranged mostly at a plane, and are contained in the case 3. The positive-electrode side heat sink 24 and the negative-electrode side heat sink 26 consist of aluminum with high thermal conductivity, and direct attachment of the negative-electrode side heat sink 26 by the side of an outer diameter is carried out, and it is grounded to the case 3. In order that both the positive-electrode side diode 23 and the negative-electrode side diode 25 may protect the connection of the lead terminal where the substrate is a square and projects from one of them, resin mould fabrication of the whole appearance is carried out at the shape of a rectangle.

[0005] In the AC generator for vehicles of the above-mentioned composition, while current is supplied to the rotator coil 13 through a brush 10 and the slip ring 9 from a battery (not shown) and magnetic flux occurs, since it drives and a rotator 7 rotates by the shaft 6, rotating magnetic field are given to a stator coil 16, and electromotive force produces a pulley 4 in a stator coil 16 with an engine. The size is adjusted by the regulator 18 and the electromotive force of this alternating current is charged by the battery while being rectified by direct current through the positive-electrode side diode 23 of a rectifier 12, and the negative-electrode side diode 25.

[0006] The rotator coil 13, a stator coil 16, the positive-electrode side diode 23, the negative-electrode side diode 25, and the regulator 18 are always exoergic during AC-machine power generation. And at a rotational frequency high in temperature, there is calorific value of 6W by 60W and the stator coil 16 with the rotator coil 13 with the AC generator of rated output current 100 first class at 120W and a regulator 18 by the sum total of 500W, the positive-electrode side

diode 23, and the negative-electrode side diode 25, for example. Too much generation of heat worsens the performance of an AC generator, and makes the life of parts fall.

[0007] Therefore, the fan 5 rotated with rotation of a rotator 7, the open air flowed in the case 3 from the opening A of a case 3 by this rotation, and the open air flowed, as arrow I of drawing 10 showed, and it has cooled the negative-electrode side heat sink 26, the negative-electrode side diode 25, the positive-electrode side heat sink 24, and the positive-electrode side diode 23. The open air flows in the direction of a radius outside by the fan 5 after that, cools the end section of the stator coil 16 of rear **, and is emitted to the open air from Opening B. Moreover, the open air flowed in the case 3 also from Opening C by rotation of a fan 5, and the open air flowed, as arrow RO of drawing 10 showed, and it has cooled the power transistor of a regulator 18. The open air flows in the direction of a radius outside by the fan 5 after that, cools the end section of the stator coil 16 of rear **, and is emitted to the opening D shell exterior. Similarly, the open air which flowed from the opening E of a drive side bearing bracket 1 flowed in the direction of a radius outside by the fan 5, and has cooled the end section of the stator coil 16 by the side of a front. The open air is emitted to the exterior of a case 3 from Opening F after that.

[0008]
[Problem(s) to be Solved by the Invention] In the AC generator for vehicles of the above-mentioned composition, in order to make lead wire of the positive-electrode side diode 23, and lead wire of the negative-electrode side diode 25 easy to connect with Sir KITTOBO-DO 27 electrically, the positive-electrode side diode 23 and the negative-electrode side diode 25 arranged on radiation, respectively so that the lead wire of the positive-electrode side diode 23 and the lead wire of the negative-electrode side diode 25 might counter, respectively that is,. In this case, although a space is not taken about connection between the circuit board 27 and the lead wire of each diodes 23 and 25 and it can connect electrically easily, since the longitudinal direction of the negative-electrode side diode 25 is arranged along the direction of a path The size of the direction of a path of the negative-electrode side heat sink 26 by the side of an outer diameter becomes large. the size (it sets to drawing 12 and is Y) of the direction of a path of a heat sink 26 Compared with the size (it sets to drawing 12 and is X) of the direction of a path of the positive-electrode side heat sink 24 by the side of a bore, it became more than it ($Y \geq X$) and there was equivalent or a trouble that it could not miniaturize.

[0009] Moreover, although the open air passes the opening section between the positive-electrode side diodes 23 after passing the opening section through between the negative-electrode side diodes 25, as drawing 12 is shown in arrow HA Since the through put was determined with the size of the opening section of the positive-electrode side diode 23, there was a trouble that did not contribute to increase of an open air through put, that is, space existed [the needlessness which does not contribute to the improvement in cooling of the negative-electrode side diode 25] in the negative-electrode side heat sink 26 by the side of an outer diameter.

[0010] Moreover, although a periphery side is an inflow side of the open air, and it is an elevated temperature on the negative-electrode side heat sink 26 as the temperature of the open air is low and the negative-electrode side heat sink 26 progresses to an inner circumference side Since the longitudinal direction of the negative-electrode side diode 25 is arranged along the direction of a path The size of the direction of a path of the negative-electrode side heat sink 26 by the side of an outer diameter had the trouble that become large, and an elevated-temperature field would occupy many and became an elevated temperature locally in the negative-electrode side heat sink 26 in the part by the side of the inner circumference of the negative-electrode side diode 25 so much.

[0011] This invention aims at obtaining the AC generator for vehicles whose cooling efficiency of the diode fixed to the heat sink by the side of an outer diameter improved while it can make the size of the direction of a path of a rectifier small by making to solve the above troubles into a technical problem.

[0012]

[Means for Solving the Problem] In the AC generator for vehicles concerning the claim 1 of this invention The positive-electrode side heat sink with which bores differ, and a shaft and a negative-electrode side heat sink cross at right angles, and are arranged at the abbreviation plane, respectively. And while the longitudinal direction is arranged along the direction of a path of a heat sink, each diode fixed to the heat sink by the side of a bore a positive-electrode side or among negative-electrode side heat sinks Each diode fixed to the heat sink by the side of an outer diameter by the open air drawn in the case by the rotation of a fan which the longitudinal direction has been arranged along with the hoop direction of a heat sink, and was attached in the rotator The diode fixed to the heat sink by the side of an outer diameter and the diode fixed to the heat sink by the side of a bore are cooled.

[0013] In the AC generator for vehicles concerning the claim 2 of this invention, the size of the direction of a path of the heat sink by the side of a bore is larger than the size of the direction of a path of the heat sink by the side of an outer diameter.

[0014] In the AC generator for vehicles concerning the claim 3 of this invention, the surface area of the heat sink by the side of a bore is larger than the surface area of the heat sink by the side of an outer diameter.

[0015] In the AC generator for vehicles concerning the claim 4 of this invention, positive-electrode side diode and negative-electrode side diode are arranged so that the opening section between positive-electrode side diodes and the opening section between negative-electrode side diodes may be located on radiation.

[0016] In the AC generator for vehicles concerning the claim 5 of this invention, two or more fins prolonged in the direction of an axis of a rotator are prepared in the rear face of the heat sink by the side of a bore.

[0017] The heat sink is constituted from aluminum by the AC generator for vehicles concerning the claim 6 of this invention.

[0018] In the AC generator for vehicles concerning the claim 7 of this invention, the stator coil to which three-phase-circuit Y connection of the lead wire was carried out is prepared in the stator core, and four diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively.

[0019] In the AC generator for vehicles concerning the claim 8 of this invention, 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core, and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively.

[0020]
[Embodiments of the Invention] Form 1. drawing 1 of operation is the cross section of the AC generator for vehicles of the form 1 of implementation of this invention. this generator The case 3 which consisted of the drive side bearing brackets 1 and commutator side bearing brackets 2 made from aluminum, The shaft 6 by which it was prepared in this case 3 and the pulley 4 was fixed to the end section, The run dollar type rotator 7 fixed to this shaft 6, and the stator 8 fixed to the internal surface within a case 3, The slip ring 9 which is fixed to the other end of a shaft 6 and supplies current to a rotator 7, The brush 10 of the couple which slides on the slip ring 9, and the brush holder 11 which contained this brush 10, It has the rectifier 50 which rectifies the alternating current which connected with the stator 8 electrically and was produced in the stator 8 to a direct current, the heat sink 17 attached in the brush holder 11, and the regulator 18 which adjusts the alternating voltage which pasted up on this heat sink 17 and was produced in the stator 8.

[0021] The rotator 7 is equipped with the rotator coil 13 which passes current and generates magnetic flux, and the field core 14 in which the rotator coil 13 is covered, it is prepared, and a magnetic pole is formed of the magnetic flux. The field core 14 consists of the 1st field-core object 21 which geared by turns [of a couple], and the 2nd field-core object 22. The centrifugal fan 5 for cooling is welded to the shaft-orientations end face of the 1st field-core object 21 and the 2nd field-core object 22. The stator 8 is equipped with the stator core 15 and the stator coil 16 which lead wire is wound around this stator core 15, and an alternating current produces in change of the magnetic flux from the rotator coil 13 with rotation of a rotator 7.

[0022] The positive-electrode side heat sink 24 with which a rectifier 50 has two or more fin 24a in a rear face with radii band-like, The positive-electrode side [four pieces] diode 23 fixed to the front face of this positive-electrode side heat sink 24 by welding, The radii band-like negative-electrode side heat sink 51 and the negative-electrode side [four pieces] diode 52 fixed to this negative-electrode side heat sink 51 by welding, It has Sir KITTOBO-DO 53 which connects electrically each diodes 23 and 52 and stator coil 16, and the three-phase alternating current produced in the stator 8 is rectified to a direct current. The positive-electrode side heat sink 24 and a shaft 6 and the negative-electrode side heat sink 52 cross at right angles, are arranged mostly at a plane, and are contained in the case 3. The positive-electrode side heat sink 24 and the negative-electrode side heat sink 52 consist of aluminum with high thermal conductivity, and direct attachment of the negative-electrode side heat sink 51 by the side of an outer diameter is carried out, and it is grounded to the case 3. In order that both the positive-electrode side diode 23 and the negative-electrode side diode 52 may protect the connection of the lead terminal where the substrate is a square and projects from one of them, resin mould fabrication of the whole appearance is carried out at the shape of a rectangle.

[0023] The plan of the positive-electrode side diode 23 which drawing 3 fixed in the plan of the rectifier 50 of drawing 2 , and drawing 4 fixed to the positive-electrode side heat sink 24 of the rectifier 50 of drawing 2 , and drawing 5 are the plans of the negative-electrode side diode 52 which fixed to the negative-electrode side heat sink of the rectifier 50 of drawing 2 . The longitudinal direction is arranged by the rectangle-like positive-electrode side diode 23 along the direction of a path of the positive-electrode side heat sink 24 like the conventional example. On the other hand, the longitudinal direction is arranged for the negative-electrode side [four pieces] diode 52 along with the hoop direction of the negative-electrode side heat sink 51 by the negative-electrode side heat sink 51 adjoined and prepared in the outer-diameter side of the positive-electrode side heat sink 24, respectively. Thereby, the direction size of a path of the negative-electrode side heat sink 51 becomes small as compared with the conventional negative-electrode side heat sink 26. on the contrary, the rate for which the negative-electrode side diode 52 accounts in the hoop direction of the negative-electrode side heat sink 51 -- large -- also becoming -- originally, since an allowance is between the negative-electrode side diodes 25, there is no need of changing the size of the hoop direction of the negative-electrode side heat

sink 51 at the hoop direction of the negative-electrode side heat sink 26 by the side of an outer diameter [0024] In the AC generator for vehicles of the above-mentioned composition, the fan 5 rotated with rotation of a rotator 7, the open air flowed in the case 3 from case 3 opening A by this rotation, and the open air flowed, as arrow I of drawing 1 showed, and it has cooled the negative-electrode side heat sink 51, the negative-electrode side diode 52, the positive-electrode side heat sink 24, and the positive-electrode side diode 23. The open air flows in the direction of a radius outside by the fan 5 after that, cools the end section of the stator coil 16 of rear **, and is emitted to the open air from Opening B. Moreover, the open air flowed in the case 3 also from Opening C by rotation of a fan 5, and the open air flowed, as arrow RO of drawing 1 showed, and it has cooled the power transistor of a regulator 18. The open air flows in the direction of a radius outside by the fan 5 after that, cools the end section of the stator coil 16 of rear **, and is emitted to the opening D shell exterior. Similarly, the open air which flowed from the opening E of a drive side bearing bracket 1 flowed in the direction of a radius outside by the fan 5, and has cooled the end section of the stator coil 16 by the side of a front. The open air is emitted to the exterior of a case 3 from Opening F after that.

[0025] With the gestalt of this operation, although a periphery side is an inflow side of the open air, and it is an elevated temperature on the negative-electrode side heat sink 51 by the side of an outer diameter as the temperature of the open air is also low and the negative-electrode side heat sink 26 progresses to an inner circumference side Since the longitudinal direction of the negative-electrode side diode 52 is arranged along with the hoop direction, it is small, and ends, the rate for which an elevated-temperature field accounts in the negative-electrode side heat sink 51 so much becomes small, and the cooling efficiency of the size of the direction of a path of the negative-electrode side heat sink 51 of the negative-electrode side diode 52 improves. In addition, the opening section between the positive-electrode side diodes 23 and the opening section between the negative-electrode side diodes 52 are on radiation, and the open air style by the centrifugal fan 5 flows smoothly on the negative-electrode side heat sink 51 and the positive-electrode side heat sink 24.

[0026] About the AC generator for vehicles of the form of this operation, when actually experimented, in the case of 20-degree C OAT, the result to which temperature fell [that the negative-electrode side heat sink 52 was 125 degrees C conventionally] at 120 degrees C was obtained.

[0027] The plan of the rectifier 60 of the AC generator for vehicles according [form 2. drawing 6 of operation] to the form 2 of implementation of this invention, the plan of the positive-electrode side diode 62 which drawing 7 fixed to the positive-electrode side heat sink 61 of the rectifier 60 of drawing 6 , and drawing 8 are the plans of the negative-electrode side diode 64 which fixed to the negative-electrode side heat sink 63 of the rectifier 60 of drawing 6 . With the form 1 of operation, although the positive-electrode side diode 23 and the negative-electrode side diode 52 were four pieces at a time, respectively, in the form of this operation, a positive-electrode side and the negative-electrode side diodes 62 and 64 are added further, and six pieces are arranged, respectively. This example is the case where it is the rectifier 60 of the AC generator for vehicles with which two stator coils which carried out three phase Y connection to the stator were prepared, and is rectifying each three-phase alternating current.

[0028] as the cure which raises cooling nature since the diode on a bore side heat sink approaches, cooling nature gets worse and the temperature of diode exceeds a diode allowable-temperature value especially, if it is going to realize without enlarging rectifier size when increasing the diode number by the conventional diode arrangement -- the size of the direction of a path of the heat sink by the side of a bore -- not expanding -- it could not but obtain but the whole rectifier and the direction size of a path had to be expanded

[0029] With the form of this operation, on the other hand, by having arranged the longitudinal direction of the negative-electrode side diode 64 along with the hoop direction of the negative-electrode side heat sink 63 With the rectifier size same before being able to make small the direction size of a path of the negative-electrode side heat sink 63 by the side of an outer diameter, consequently increasing the number of diodes, The size of the direction of a path of the positive-electrode side heat sink 61 by the side of a bore can be enlarged. That is, the cooling surface product of the positive-electrode side heat sink 61 can be expanded, and the cooling nature of the positive-electrode side diode 62 by the side of a bore is secured (drawing 9 (A) and drawing 9 (B) referring-to- $T_1 > T_3$, $T_4 > T_2$, $T_5 = T_6$). Moreover, since the design flexibility in a rectifier 60 increased in this way, flexibility increases also to reduction of the pressure loss of the open air style in a rectifier 60, and the cooling nature of the stator coil 16 cooled by a fan's 5 discharge side open air improves. In addition, although the negative-electrode side heat sink is arranged to the outer-diameter side and the positive-electrode side heat sink has been arranged to the bore side with the form of each above-mentioned implementation, of course, this invention is applicable also to the rectifier which has arranged the negative-electrode side heat sink to the bore side, and has arranged the positive-electrode side heat sink to the outer-diameter side. Moreover, even when seven or more diodes are formed in each heat sink, respectively, this invention of it being applicable is natural.

[0030]

[Effect of the Invention] As explained above, according to the AC generator for vehicles concerning the claim 1 of this invention The positive-electrode side heat sink with which bores differ, and a shaft and a negative-electrode side heat sink cross at right angles, and are arranged at the abbreviation plane, respectively. And while the longitudinal direction is arranged along the direction of a path of a heat sink, each diode fixed to the heat sink by the side of a bore a positive-electrode side or among negative-electrode side heat sinks Each diode fixed to the heat sink by the side of an outer diameter by the open air drawn in the case by the rotation of a fan which the longitudinal direction has been arranged along with the hoop direction of a heat sink, and was attached in the rotator Since the diode fixed to the heat sink by the side of an outer diameter and the diode fixed to the heat sink by the side of a bore are cooled While being able to make the size of the direction of a path of a rectifier small and being able to miniaturize, the cooling nature of the diode fixed to the heat sink by the side of an outer diameter improves.

[0031] Moreover, according to the AC generator for vehicles concerning the claim 2 of this invention, it can be made larger than the size of the direction of a path of the heat sink by the side of an outer diameter, and the cooling nature of the diode fixed to the heat sink by the side of a bore can improve, the arrangement flexibility of the diode can reduce the pressure loss of increase and an open air style, for example, the cooling nature of the size of the direction of a path of the heat sink by the side of a bore of the stator of the downstream of the diode improves

[0032] Moreover, according to the AC generator for vehicles concerning the claim 3 of this invention, the surface area of the heat sink by the side of a bore can be made larger than the surface area of the heat sink by the side of an outer diameter, and can acquire the same effect as a claim 2.

[0033] Moreover, since according to the AC generator for vehicles concerning the claim 4 of this invention positive-electrode side diode and negative-electrode side diode are arranged so that the opening section between positive-electrode side diodes and the opening section between negative-electrode side diodes may be located on radiation, within a rectifier, the open air flows smoothly and its cooling nature of the diode by the side of a positive electrode and a negative electrode improves.

[0034] Moreover, since two or more fins prolonged in the direction of an axis of a rotator are prepared in the rear face of the heat sink by the side of a bore according to the AC generator for vehicles concerning the claim 5 of this invention, the touch area of the open air and a heat sink increases, and the cooling nature of the diode fixed to the heat sink improves.

[0035] Moreover, according to the AC generator for vehicles concerning the claim 6 of this invention, since the heat sink consists of thermally conductive high aluminum, diode is cooled cheaply efficiently.

[0036] Moreover, since according to the AC generator for vehicles concerning the claim 7 of this invention the stator coil to which three-phase-circuit Y connection of the lead wire was carried out is prepared in the stator core and four diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, it is small and the AC generator for vehicles of the three-phase-circuit Y connection excellent in cooling nature can be obtained easily.

[0037] Since according to the AC generator for vehicles concerning the claim 8 of this invention 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, it is small and the AC generator for vehicles of 2 sets of three-phase-circuit Y connection excellent in cooling nature can be obtained easily.

[Translation done.]

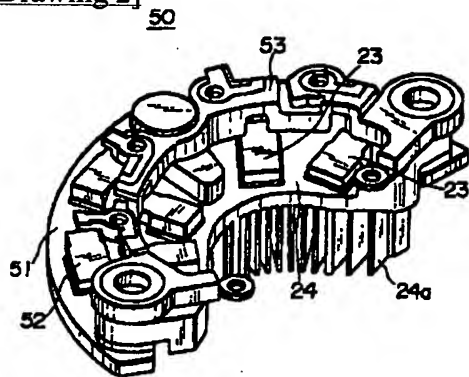
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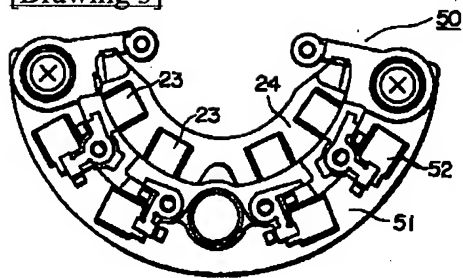
DRAWINGS

[Drawing 2]

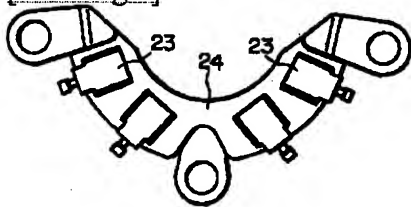


- 23 : 正極側ダイオード
 24 : 正極側ヒートシンク
 24a : フィン
 51 : 負極側ヒートシンク
 52 : 負極側ダイオード
 53 : サーマットボード

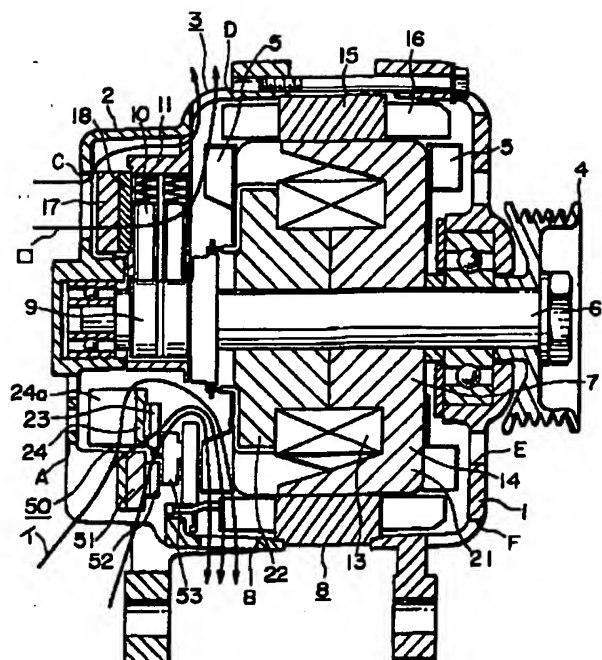
[Drawing 3]



[Drawing 4]

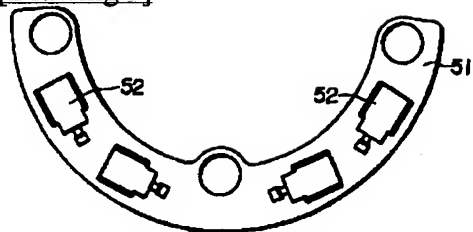


[Drawing 1]

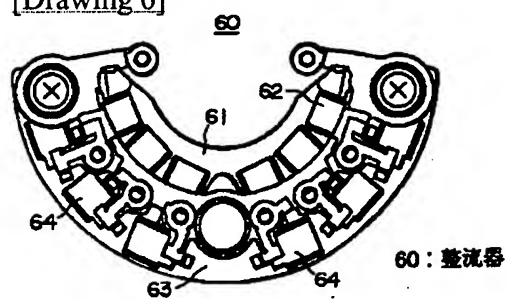


- 3: ケース
- 5: ファン
- 6: シャフト
- 7: 回転子
- 8: ステータ
- 50: 整流器

[Drawing 5]

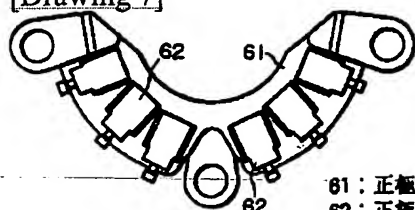


[Drawing 6]



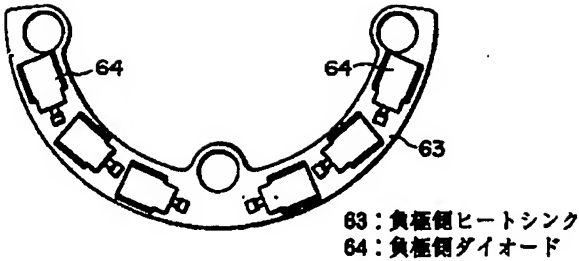
60: 整流器

[Drawing 7]

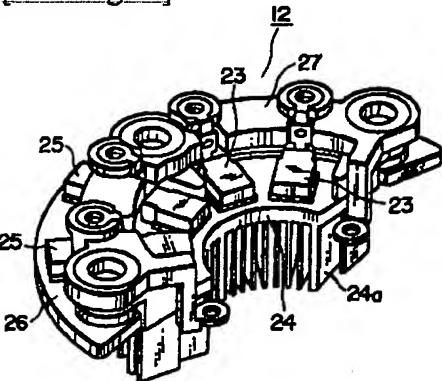


- 61: 正極側ヒートシンク
- 62: 正極側ダイオード

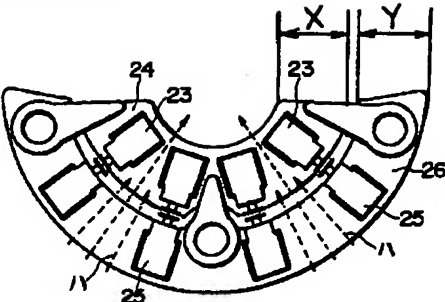
[Drawing 8]



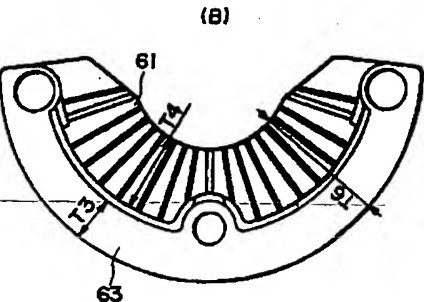
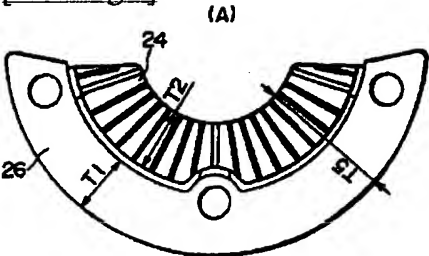
[Drawing 11]



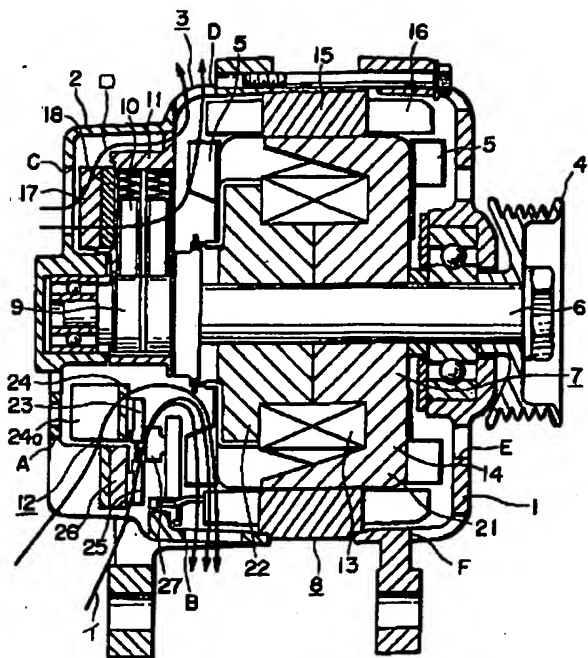
[Drawing 12]



[Drawing 9]



[Drawing 10]



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CORRECTION or AMENDMENT

[Official Gazette Type] Printing of amendment by the convention of 2 of Article 17 of patent law.

[Section partition] The 4th partition of the 7th section.

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H02K 19/24

9/02

[FI]

H02K 19/24

Z

9/02

Z

[Procedure revision]

[Filing Date] February 14, Heisei 14 (2002. 2.14)

[Procedure amendment 1]

[Document to be Amended] Specification.

[Item(s) to be Amended] Claim.

[Method of Amendment] Change.

[Proposed Amendment]

[Claim(s)]

[Claim 1] It has a case, the shaft prepared possible [rotation] in this case, the rotator fixed to this shaft, the stator in which the stator coil by which it was fixed to the internal surface of the aforementioned case, and lead wire was wound around the stator core was prepared, and the rectifier which rectifies the alternating current which connected with the aforementioned stator coil electrically and was produced in the stator coil while being prepared in the aforementioned case to a direct current.

The aforementioned rectifier is the AC generator for vehicles which two or more negative-electrode side diodes were fixed by the front face of a radii band-like negative-electrode side heat sink, and was constituted while two or more positive-electrode side diodes are being fixed to the front face of a radii band-like positive-electrode side heat sink. The aforementioned positive-electrode side heat sink with which bores differ, and the aforementioned shaft and the aforementioned negative-electrode side heat sink cross at right angles, and are arranged at the abbreviation plane, respectively. And while the longitudinal direction is arranged along the direction of a path of a heat sink, each diode fixed to the heat sink by the side of a bore a positive-electrode side or among negative-electrode side heat sinks Each diode fixed to the heat sink by the side of an outer diameter by the open air drawn in the case by the rotation of a fan which the longitudinal direction has been arranged along with the hoop direction of a heat sink, and was attached in the rotator The AC generator for vehicles with which the diode fixed to the heat sink by the side of an outer diameter and the diode fixed to the heat sink by the side of a bore are cooled.

[Claim 2] The size of the direction of a path of the heat sink by the side of a bore is a larger AC generator for vehicles according to claim 1 than the size of the direction of a path of the heat sink by the side of an outer diameter.

[Claim 3] The surface area of the heat sink by the side of a bore is a larger AC generator for vehicles according to claim 2 than the surface area of the heat sink by the side of an outer diameter.

[Claim 4] The AC generator for vehicles given in any of the claim 1 in which positive-electrode side diode and negative-electrode side diode are arranged, or a claim 3 they are so that the opening section between positive-electrode side diodes and the opening section between negative-electrode side diodes may be located on radiation.

[Claim 5] The AC generator for vehicles given in any of the claim 1 by which two or more fins prolonged in the direction of an axis of a rotator are prepared in the rear face of the heat sink by the side of a bore, or a claim 4 they are.

[Claim 6] A heat sink is an AC generator for vehicles given in any of the claim 1 which consisted of aluminum, or a claim 5 they are.

[Claim 7] The AC generator for vehicles given in any of the claim 1 by which the stator coil to which three-phase-circuit Y connection of the lead wire was carried out is prepared in the stator core, and four diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, or a claim 6 they are.

[Claim 8] The AC generator for vehicles given in any of the claim 1 by which 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core, and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, or a claim 6 they are.

[Claim 9] Positive-electrode side diode and negative-electrode side diode are an AC generator for vehicles given in any of the claim 1 which is a rectangle-like, or a claim 8 they are.

[Claim 10] The AC generator for vehicles given in any of the claim 1 by which seven or more diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively or a claim 6, and a claim 9 they are.

[Procedure amendment 2]

[Document to be Amended] Specification.

[Item(s) to be Amended] 0019.

[Method of Amendment] Change.

[Proposed Amendment]

[0019] In the AC generator for vehicles concerning the claim 8 of this invention, 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core, and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively. Moreover, in the AC generator for vehicles concerning the claim 9 of this invention, positive-electrode side diode and negative-electrode side diode are rectangles-like. Moreover, in the AC generator for vehicles concerning the claim 10 of this invention, seven or more diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively.

[Procedure amendment 3]

[Document to be Amended] Specification.

[Item(s) to be Amended] 0037.

[Method of Amendment] Change.

[Proposed Amendment]

[0037] Since according to the AC generator for vehicles concerning the claim 8 of this invention 2 sets of stator coils to which three-phase-circuit Y connection of the lead wire was carried out are prepared in the stator core and six diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, it is small and the AC generator for vehicles of 2 sets of three-phase-circuit Y connection excellent in cooling nature can be obtained easily. Moreover, according to the AC generator for vehicles concerning the claim 9 of this invention, since positive-electrode side diode and negative-electrode side diode are rectangles-like, the alignment of the positive-electrode side diode at the time of manufacture and negative-electrode side diode is easy for them. moreover, as shown in the AC generator for vehicles concerning the claim 10 of this invention, even while seven or more diodes are being fixed to the heat sink by the side of a bore, and the heat sink by the side of an outer diameter, respectively, it can miniaturize -- etc. -- an effect can be acquired

